

## TRANSMUTATIONS OF NUCLEAR WASTE

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Soon after Pons and Fleischmann announced the discovery of Cold Fusion (CF) in 1989, researchers began to announce the anomalous production of elements, beginning with helium and tritium and continuing into the heavy atoms. By 1995, about 120 papers had reported the CF production of tritium in experiments with palladium.

In the early 1990s, physicist Ken Shoulders received five patents for his discovery of the High Density Charge Cluster (HDCC), "a relatively discrete, self-contained, negatively charged, high-density state of matter...[a bundle of electrons that] appears to be produced by the application of a high electrical field between a cathode and an anode" (i.e., 2–10 kV at the tip of a sharply pointed electrode). It can also be described as "a spherical monopole oscillator". Shoulders has given it the name "Electrum Validum" (EV), meaning "strong electron", from the Greek *elektron* (electronic charge) and the Latin *valere* (to be strong, having power to unite). EVs have been credited with accomplishing CF transmutations.

Ken Shoulders also invented a method of Plasma-Injected Transmutation for the remediation of nuclear waste by EVs, and has demonstrated the complete elimination of radioactivity in high-level nuclear material.<sup>14</sup>

EVs apparently function as a collective accelerator with sufficient energy to inject a large group of nuclei into a target and promote nuclear cluster reactions. The composition of EVs allows for the inclusion of some  $10^5$  nuclides. Ions can be added to EVs until the net charge becomes positive. Such EVs are called Nuclide-EVs (NEVs). According to Shoulders:

"The NEV acts as an ultra-massive, negative ion with high charge-to-mass ratio. This provides the function of a simple nuclear accelerator... Such nuclear reactions are fundamentally an event involving large numbers, and not one of widely iso-

lated events working at an atomic level..."

Shoulders offers an *ad hoc* explanation of these results as being "due largely to a nuclear cluster reaction having an unknown form of coherence".

Other researchers (Rod Neal, Stan

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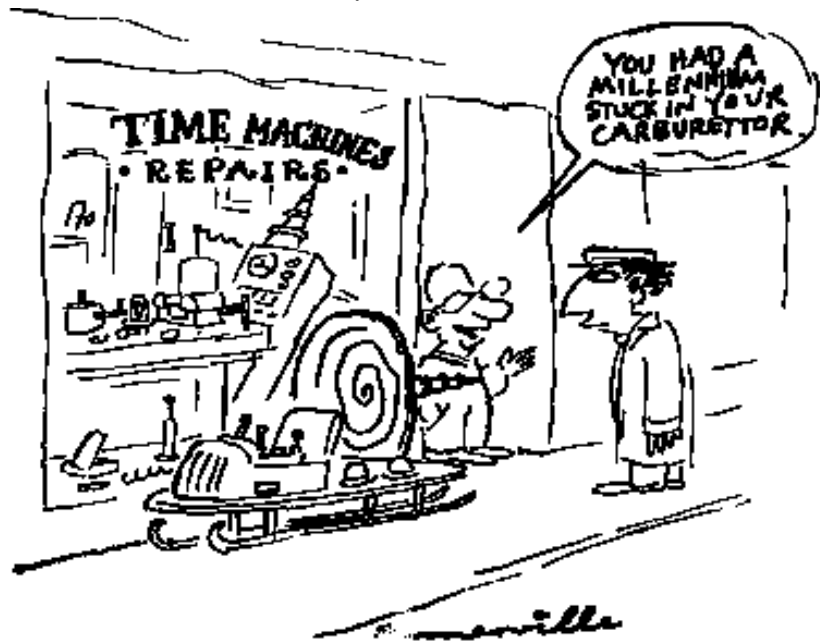
Gleeson, "the Cincinatti Group", William Barker, etc.) also filed for patents on similar applications. The Neal-Gleeson Process has been shown to stabilise naturally radioactive solutions of thorium and uranium compounds up to 70% within a few hours in an electrochemical reactor. Thorium can be fissioned into mercury and

neon. Valve metals (whose oxides emit electrons) can be excited to produce galvano-luminescence in aqueous solution. When the charge gradient exceeds a critical threshold (i.e., one million volts), sparks are produced in the form of charge clusters which are believed to be the active mechanism in this method of transmutation.

In their reports of the experimental results, Neal and Gleeson *et al.* noted:

"Because there is a close agreement between the reduction in thorium and the reduction of radioactivity of the thorium daughter products, it is assumed that the Neal-Gleeson Process has about the same capability to change both thorium nuclei and the nuclei of the daughter products into other elements which are not radioactive..."

"A process which can cause the higher atomic number elements to be split into smaller elements appears to be a desirable method by which certain radioactive elements can be handled. It is highly desirable to be able to select process-control parameters so that only stable daughter nuclei of the parent elements are produced. In this way, the radioactivity of today's highly radioactive slurries can be ameliorated."



# NEWSCIENCE NEWSCIENCE NEWSCIENCE

The rapid conversion of radioactive elements to stable daughter elements can be accomplished by several other methods. The first such method was announced in 1979 by Radha Roy. X-rays (generated by a linear accelerator) were used to eject nuclei from the target, resulting in short-lived isotopes. Only 20 years later, the National Laboratory is developing a project for Accelerator Transmutation of Waste.

The Australian inventor Yull Brown developed a novel method of electrolyzing water to produce a compressed stoichiometric mixture of hydrogen and oxygen ions (popularly known as "Brown's Gas") that is burned in an approx. 2:1 ratio. Since the early 1980s, Yull Brown claimed to be able to transmute radioactive material into inert forms by fusing it in the flame produced by his hyfuel. His patents mention that "The invention also relates to *atomic* welding..." (USP #4,014,777 and #4,081,656).

Yull Brown's first successful experiment with <sup>60</sup>Co (cobalt-60, or Co-60) radionuclides reduced the activity by about 50% in 10 minutes. The process was replicated by the Baotou Nuclear Institute, China, in 1991.

In a demonstration witnessed by [now former] US Congressman Berkley Bedell, the radioactivity of americium was quickly reduced by 2500% with the Brown's Gas torch. The Geiger counter reading registered 16,000 curies/minute before, and less than 100 curies/minute afterwards. Congressman Bedell said:

"It has been my good pleasure to witness experiments done by Dr Yull Brown, in which it appeared to me that he significant-

ly reduced the radioactivity in several nuclear materials. Under the circumstances, I believe it is very important for our federal government to completely investigate Dr Yull Brown's accomplishments in this area."

If the US Government is completely investigating Brown's Gas, it is doing so in

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complete secrecy.

In August 1992, Yull Brown made another demonstration before several members of the Department of Energy and the Hon. Dan Haley, at the request of Congressman Bedell. The Geiger counter reading from Co-60 was reduced to 0.04% of the original level.

Another demonstration was conducted for a group of Japanese nuclear scientists, at which time Co-60 was reduced from 24,000 mR/hr to 12,000 mR/hr with one brief treatment.<sup>5-7</sup>

Paul Brown (Nuclear Solutions, Aurora, Colorado) has developed a novel method to

remediate nuclear waste by photonuclear reaction with gamma rays. The technology utilizes principles of physics—e.g., giant dipole resonance—that have been overlooked in their possible application in treatment of nuclear waste. Brown states:

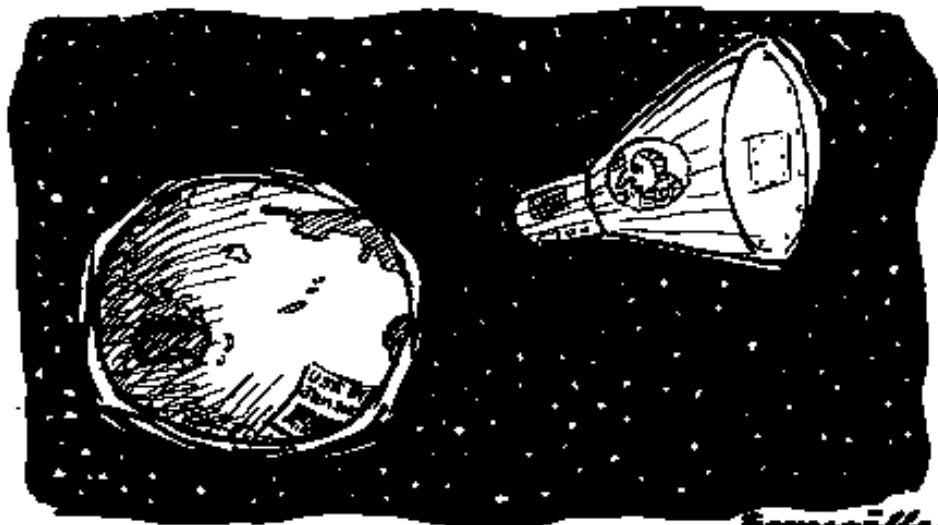
"Photonuclear reactions induced by gamma ray absorption by the nucleus do not suffer the shortcomings of neutron reactions. Simply stated, the process is gamma irradiation with energies greater than the binding energy of the neutron to the nucleus. That is, a gamma photon of an energy equal to or greater than the binding energy which comes close to the nucleus is absorbed through giant dipole resonance resulting in the emission of a neutron. This well-known nuclear reaction has dramatic application to waste remediation..."

"The neutrons produced by the ( , ) processing may in turn be used for neutron transmutation by the processes... For many fission products, the neutron capture cross-sections in a thermal spectrum can give substantial transmutation rates..."

Brown has proposed another application of giant dipole resonance in a theoretical Photon Reactor which would produce power by burning nuclear waste:

"A linear accelerator, preferably of the monochromatic type, accelerates electrons which are directed onto a high target such as tungsten, to generate gamma rays about 9 MeV, which are directed onto the fuel material such as U-238 which results in the ( , f) reaction, thus releasing about 200 MeV. A reactor built according to this principle, requiring an accelerator driven by 1 MeV, will develop about 20 MW of power. The reaction is not self-sustaining and stops when the beam is turned off. This accelerator-driven reactor may be used to burn up spent fuel from fission reactors, if simply operated at 10 MeV. The photo-fission results in typical spent-fuel waste products such as Cs-137 and Sr-90 which undergo photodisintegration by the ( , f), resulting in short-lived or stable products. Chemical separation of the spent-fuel isotopes is not necessary..."<sup>8</sup>

Ronald Brightson (Clustron Sciences) has presented theoretical and experimental evidence for the validity of his own Nucleon Cluster Model (NCM), which predicts that a relatively low-energy photon can promote a nuclear reaction under certain specific conditions. Brightson



"Houston, I think there may be a problem..."

analysed the periodicities and systematics of atomic numbers and masses and deduced that all  $\beta$ -stable nuclides are composed of deuterons (NP clusters), tritons (NPN), and He<sub>3</sub> (PNP) nuclei. His patent application includes a method of remediating nuclear waste by the induction of fission in the radioactive isotopes. The imposition of an external magnetic field in resonance with the magnetic moment of a particular nucleon cluster (NP, NPN, PNP) can excite the select cluster (without disturbing other clusters in the target) to burst from the nucleus and perform a transmutation to daughter products of smaller mass and greater stability.

A catalytic process for transmutative remediation of nuclear waste was invented by Jack Keller in 1993.

Roberto Monti (Burns Development Ltd) announced a method of transmutation to neutralise radioactive material at a congress on low-energy transmutation (ICCF-5, Monaco, 1996). He utilised ignition methods such as those developed by Joe Champion. When applied to radioactive materials, the radioactivity was greatly reduced after the ignition.

In their analysis of the "energy gain and nuclear transmutation by low-energy *p*- or *d*-reactions in metal lattices", Heinrich Hora, George Miley and J. Kelly offered hope for the "programmed transmutation of added nuclides, especially long-lived nuclear waste and plutonium":

"One can actively incorporate nuclides into the surface area of the active metals or nearby. These additional nuclides can then be subject to low-energy nuclear transmutation..."

"One application of the mentioned transmutation is the long-lived nuclear waste from nuclear fission reactors... It is an important aim to make plutonium fully extinct by nuclear transmutation into chemically different nuclei... These kinds of nuclear transmutations are indeed possible by using ion beams...of more than 10 MeV per nucleon or spallation processes with up to 10 GeV protons. In view of the very expensive accelerators needed for this purpose, and [because] the ion currents are very small, there is no economic possibility in sight from this method. The invention described in this (Clean Energy Technology) patent [for] the low-energy transmutation by protons provides a low-cost method for converting the long-lived waste nuclides and plutonium into harmless, non-radioactive elements."

Beginning in 1958, Russian geophysicist Dr Georgiy S. Rabzi developed methods of transmutation that combined geo-electric and artificial fields and temperature control to direct transmutation in solids and liquids. For example, a 99.5% Pb was treated at 650°C to yield up to 3% Ag, plus Cd and Ge (15 March 1994). No radioactivity was observed in any of the experiments. At the ICCF-5 meeting, Dr Rabzi claimed that his "natural cold fission" is a safe method with which to stabilise nuclear waste.

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Numerous reports in the literature of physics describe deviations (from 0.1 to 5.0 per cent) from the standard constant decay rates of natural radioactivity, some by extra-nuclear influences (including the human mind).

Physicists Elizabeth Rauscher, Glen Rein and associates have investigated the

interactions of Co-60 with non-Hertzian energies such as the scalar fields generated by the Smith coil (a Caduceus-wound coil, invented by Canadian engineer Wilbur B. Smith in the 1960s). When energised (3 mA/5 W), the non-inductive Smith coil (8.2 ohms) reduced the background radiation by 97% (from 0.5 mR/hr to 0.0015 mR/hr). Yet when applied to Co-60, the radioactivity *increased* from 150 to 250 mR/hr!<sup>10</sup>

A few other exotic possibilities may exist for the transmutation of nuclear waste, such as the radionic transmutations demonstrated by the amazing DeLaWarr camera. Tom Bearden and others have recommended the use of scalar interferometry to withdraw energy from the nucleus in a gentle manner or by outright dematerialisation.<sup>11</sup>

Unfortunately, radioactivity also can be *increased* by simple means. Adolf Gaschler obtained a British patent in 1920 for the enrichment of radium by a treatment with several kilowatts of direct current. Thomas H. Moray developed a method in the 1950s to enrich uranium by high-energy bombardment. Fortunately, these technologies are dormant.

Meanwhile, it is imperative that we develop every possible pathway to the deactivation of nuclear waste and weapons.

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#### Endnotes

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